WHAT IS CLAIMED IS:

1. A process for producing a silicon single crystal that is doped with a highly volatile foreign substance, comprising:

adding a quantity of the foreign substance N_0 to a melt in order to achieve a desired resistance of the melt;

pulling the single crystal from the melt which is held under predetermined process conditions in a crucible;

after-doping the melt at a time t at least once during the pulling process with a quantity $\Delta N(t)$ of the foreign substance, in order to compensate for losses caused by the foreign substance evaporating out of the melt, wherein the quantity $\Delta N(t)$ of the foreign substance is calculated according to the equation:

$$\Delta N(t) = N_0 - N(t) = N_0 \cdot (1 - e^{-\lambda_a \cdot t})$$

or according to the approximation equation:

$$\Delta N(t) = N_0 \cdot \lambda_a \cdot t$$

where λ_a is an evaporation coefficient which describes a process-specific evaporation behavior of the foreign substance and which is obtained after a resistance profile R(t) of a further single crystal has been measured and by calculation according to the equation:

$$R(t) = R_0 \cdot e^{\lambda_a \cdot t}$$

where R_0 is a starting resistivity and the further single crystal is pulled under the predetermined process conditions without being after-doped with the foreign substance.

2. The process as claimed in claim 1, wherein the foreign substance used is a highly volatile dopant which is in elemental or molecular form and contains at least one element selected from the group consisting of arsenic, antimony and phosphorus.

3. The process as claimed in claim 1, wherein the evaporation coefficient λ_a is integrated in an automatic process control.

4. A silicon single crystal that is doped with a highly volatile foreign substance, the crystal produced from a process comprising:

adding a quantity of the foreign substance N_0 to a melt in order to achieve a desired resistance of the melt;

pulling the single crystal from the melt which is held under predetermined process conditions in a crucible;

after-doping the melt at a time t at least once with a quantity $\Delta N(t)$ of the foreign substance, in order to compensate for losses caused by the foreign substance evaporating out of the melt, wherein the quantity $\Delta N(t)$ of the foreign substance is calculated according to the equation

$$\Delta N(t) = N_0 - N(t) = N_0 \cdot (1 - e^{-\lambda_a \cdot t})$$

or according to the approximation equation

$$\Delta N(t) = N_0 \cdot \lambda_a \cdot t.$$

where λ_a is an evaporation coefficient which describes a process-specific evaporation behavior of the foreign substance and which is obtained after a resistance profile $R(t)$ of a further single crystal has been measured and by a calculation according to the equation

$$R(t) = R_0 \cdot e^{\lambda_a \cdot t}$$

where R_0 is a starting resistivity and the further single crystal is pulled under the predetermined process conditions without being after-doped with the foreign substance.

5. The single crystal as claimed in claim 4, wherein the crystal has elastic and mechanical properties, oxygen content, oxygen precipitation and internal point defect distribution that are set by means of a deliberate dopant specification produced in the process.

6. A semiconductor wafer produced from a single crystal according to claim 4.